

CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

What is claimed is:

1. (Currently Amended) A heat exchanger comprising:  
a shell having an inner chamber defined by an inside wall surface, and having at least one opening adjacent an end of the shell, the inside wall surface including a recessed section extending axially a distance from an end of the shell, the recessed section having a ridge extending radially outwardly from the inside wall surface to the recessed section;  
a tube bundle disposed within the inner chamber and comprising a plurality of tubes arranged together;  
a header plate attached to the tubes and positioned adjacent an end of the tube bundle, the header plate including an outside diameter having an axially projecting section that extends therefrom, and a radially projecting lip that extends from an end of the axially projecting section, wherein the axially projecting section and radially projecting lip are integral with the header plate, and wherein the outside diameter further comprises a shoulder at the transition with the axially projecting section, and wherein the shoulder is positioned against the ridge that fits within the inside wall surface to

provide a nested attachment junction therebetween between the header plate and the shell.

2. (Canceled)

3. (Canceled)

4. (Currently Amended) The heat exchanger as recited in claim 2 1 further comprising brazing material interposed between the shell recessed section and the axially projecting section header plate.

5. (Currently Amended) The heat exchanger as recited in claim 3 1 further comprising a tank attached to the shell adjacent the shell end, wherein the header plate lip is interposed between the shell and an end of the tank.

6. (Original) The heat exchanger as recited in claim 5 wherein at least one of the end of the tank and the end of the shell includes a chamfer along an outside surface, and welding material is interposed between the tank and shell ends.

7. (Currently Amended) A shell and tube heat exchanger comprising:

a shell having an inner chamber defined by an inside wall surface, and having at least one opening adjacent an end of the shell, and having the shell having a recessed section

extending circumferentially around the inside wall surface and extending axially a distance from the end, and further having a ridge that extends radially outwardly from the inside wall surface to the recessed section;

a tube bundle disposed within the inner chamber and comprising a plurality of tubes arranged together;

a header plate attached to the tubes and positioned adjacent an end of the tube bundle, the header plate including;

an outside diameter having an axially projecting section that fits within the recessed section, wherein the header plate is positioned against the shell ridge to provide a nested attachment junction therebetween; and

a lip projecting radially outwardly away from the axially projecting section, wherein the axially projecting section and lip are both integral with the header plate;  
and

brazing material interposed between the axially projecting section and the recessed section.

8. (Currently Amended) The heat exchanger as recited in claim 7 wherein the ~~header plate further comprises a lip that projects radially outwardly from the axially projecting section,~~ and ~~that~~ is positioned adjacent the shell end.

9. (Original) The heat exchanger as recited in claim 8 further comprising a tank attached to the shell adjacent the shell end, wherein the header plate lip is interposed between the shell and an end of the tank.

10. (Original) The heat exchanger as recited in claim 9 wherein at least one of the end of the tank and the end of the shell includes a chamfer along an outside surface, and welding material is interposed between the tank and shell ends.

11. (Currently Amended) A method for making a heat exchanger comprising the steps of:

inserting a tube bundle comprising a plurality of combined tubes into an internal chamber of a surrounding shell, the shell including an open end, and the tubes being connected to a header plate;

forming a nested attachment junction between the shell and the header plate by placing an outside diameter of the header plate adjacent to an inside wall surface of the shell, wherein the inside wall surface of the shell includes a recessed section adjacent to the shell open end, the recessed section including a ridge that extends radially outwardly from the shell inside wall surface to the recessed section, wherein the header plate includes an axially projecting section extending from the outside diameter and a lip extending radially outwardly from the axially

projecting section, the outside diameter comprising a shoulder at the transition to the axially projecting section, wherein the nested attachment junction is formed between the header plate shoulder and shell ridge, and wherein the lip is positioned along the shell open end; and

forming a braze joint in the nested attachment junction by depositing brazing material between the header plate ~~outside-diameter~~ and the shell ~~inside-wall~~ surface.

12. (Canceled)

13. (Canceled)

14. (Original) The method as recited in claim 13 further comprising the step of attaching a tank to the shell adjacent the shell end, wherein the header plate lip is interposed between the shell and an end of the tank.

15. (Original) The method as recited in claim 14 wherein at least one of the end of the tank and the end of the shell includes a chamfer along an outside surface, and the step of attaching the tank further comprises depositing welding material between the tank and shell ends.

16. (New) The heat exchanger as recited in claim 5 wherein the tank includes a recessed wall section adjacent the tank end, and wherein at least a portion of the header plate

axially projecting section is disposed therein when the tank is attached to the shell.

17. (New) The heat exchanger as recited in claim 1 further comprising a tank connected to the shell end, wherein the tank comprises an inside wall surface having a recessed section positioned adjacent an end of the tank that is sized to fit within the recessed section of the shell.

18. (New) The heat exchange as recited in claim 9 wherein the tank includes a recessed wall section adjacent the tank end, and wherein at least a portion of the header plate axially projecting section is disposed therein when the tank is attached to the shell.

19. (New) The heat exchanger as recited in claim 7 further comprising a tank connected to the shell end, wherein the tank comprises an inside wall surface having a recessed section positioned adjacent an end of the tank that is sized to fit within the recessed section of the shell.